

Numbers every software engineer should know

Operation name	Time
L1 cache reference	0.5 ns
Branch mispredict	5 ns
L2 cache reference	7 ns
Mutex lock/unlock	100 ns
Main memory reference	100 ns
Compress 1K bytes with Zip	10,000 ns = 10 μ s
Send 2K bytes over 1 Gbps network	20,000 ns = 20 μ s
Read 1 MB sequentially from memory	250,000 ns = 250 μ s
Round trip within the same datacenter	500,000 ns = 500 μ s
Disk seek	10,000,000 ns = 10 ms
Read 1 MB sequentially from network	10,000,000 ns = 10 ms
Read 1 MB sequentially from disk	30,000,000 ns = 30 ms
Send packet CA->Netherlands->CA	150,000,000 ns = 150 ms

Base 2		
Power	Full name	Short name
2 ¹⁰	1 Kibibyte	1 KiB
2 ²⁰	1 Mebibyte	1 MiB
2 ³⁰	1 Gibibyte	1 GiB
2 ⁴⁰	1 Tebibyte	1 TiB
2 ⁵⁰	1 Pebibyte	1 PiB

Base 10		
Power	Full name	Short name
10 ³	1 Kilobyte	1 KB
10 ⁶	1 Megabyte	1 MB
10 ⁹	1 Gigabyte	1 GB
10 ¹²	1 Terabyte	1 TB
10 ¹⁵	1 Petabyte	1 PB